special communication

The National Oncology Program: a Yemeni-Canadian partnership

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Cancer in developing countries is growing and will soon be a major problem as life expectancy increases. This article outlines the experience and future objectives of a partnership between Yemeni and Canadian oncology professionals in their attempt to develop a National Oncology Program in Yemen. We review current knowledge of the epidemiology, social, educational and economic challenges as well as suggested initial steps in developing a relevant oncology program for this society.

Cancer in developing countries is a growing and soon to be a major problem as life expectancy increases. There are 11 million documented cancer cases worldwide, and more than half (6 million) occur in low and middle income countries. The American Cancer Society estimates that this number will increase to 27 million cases by 2050, mainly due to a growing and aging population.[1] Cancer is now the second leading cause of death from chronic disease after cardiovascular disease in developing countries. Five of 7.5 million global cancer deaths occurred in the developing world in 2007. At the World Health Assembly in 2005, the World Health Organization (WHO) passed a resolution calling for improved cancer prevention measures, early detection and treatment in all WHO member state countries. The Institute of Medicine produced a report in 2007, with international input on opportunities for cancer control in low- and middle-income countries. This report provides an excellent global summary of cancer control strategies and dispels the idea that we need to conquer infectious diseases before turning to chronic diseases. One conclusion is that without support from the developed world, it is unlikely that low income countries will make any significant progress in cancer control.[2]

Needs Assessment

Why expend so much effort to develop an oncology program in developing countries when there are so many other greater threats to health in these societies? Using Yemen as a case in point, it should be noted that it is also very costly not to provide cancer care inasmuch as the affluent classes will seek treatment abroad at international market prices while those who cannot afford to seek treatment will suffer and die prematurely, also a cost to the nation. The Yemeni government recognized some time ago that it would be necessary to develop a national strategy in order to focus on cancer prevention, diagnosis and treatment in an orderly way. At the time there was no facility or organization specifically devoted to cancer care. By the beginning of the decade there was activity toward development of a first cancer treatment facility. The acquisition of a first team of technical and professional experts came to be seen as the core of a future nationwide network of centres; the current reality on the ground is the National Oncology Centre (NOC) in Sana'a.

Although there are significant declines in cancer mortality in the developed world, establishing an infrastructure for cancer prevention, screening, diagnosis and treatment requires time. The investment needed to achieve these goals is significant, but there are many low cost, high benefit approaches that can be initially undertaken. For instance, major reductions in pediatric cancer mortality have occurred in developing countries, particularly through partnerships with established pediatric oncology

centers from developed countries; Yemen has one of the highest proportions of young children in the world with almost half the population being under age 15.

The true cancer incidence in Yemen is unknown due to limited resources for pathology, the scarcity and quality of medical records, and limited epidemiology resources, but most importantly because cancer is often hidden. Limited experience from Bawazir and the NOC suggest that most common cases (generally at advanced stage) include head and neck, especially nasopharynx, breast, gastrointestinal (especially esophagus and gastric, colorectal, hepatocellular carcinoma), lymphomas, cervical, testicular and pediatric cancers.[3-5] The WHO online infobase estimates a total of 10 000 cancer deaths in Yemen in 2005 with 8000 of these occurring before age 70. Cancer deaths in Yemen accounted for about 5.6% of all deaths in 2005 and are projected to reach 8.4% in 2030, overshadowed by communicable and cardiovascular diseases.[6] Lung cancer is not prominent although a lack of diagnostic facilities may underestimate its true incidence. In Yemen, most tobacco is not smoked but is chewed. Tobacco use was close to 20% in the Youth Tobacco Survey.[7]

Current Status

Five percent of per capita GDP ($82) was spent on health care in 2004 (Table 1).[8] On the positive side, immunization against childhood diseases is rapidly improving. UNICEF was able to provide three doses of hepatitis B vaccine for two dollars, which can be subsidized through the Global Alliance for Disease and Immunization. The WHO national coverage rate for hepatitis B was 86% in 2005 compared with 49% in 2004. The true incidence of human papilloma virus (HPV) and human immunodefiency virus (HIV) is uncertain, but a recent and growing Somali refugee population in the south has resulted in the need for HIV clinics in Mukalla.[9] There is a dire shortage of health workers in all medical fields and no specific in-country oncology training programs currently exist. There are few cancer screening facilities. Demand for systemic and radiation therapies is increasing rapidly, but the availability is limited. Some cancer treatment products paid by the government require approval by the Ministry of Health. Increasingly, these consist of drugs produced by firms in developing countries although there are concerns regarding their efficacy, safety and immunogenicity.[10-12]

Table 1. Health statistics for Yemen.

Per capita GDP	$1,000
Percent of GDP spent on health care	5.0%
Average life expectancy (years)	62.5
Rural population	75%
Illiteracy rate (M/F)%	29.8% / 62.1%
Unemployment rate	35%
Tobacco use (grade 7-9)	16-21%
Prevention programs	Hepatitis B immunization
National Cancer Registry	No
Medical schools	5
Health human resources /1,000	
Physicians	0.33
Nurses	0.64
Pharmacists	0.13
Oncology facilities	1
Radiation oncology units	1

Yemen Poverty Assessment Report 2007. The World Bank. Available from: http://go.worldbank.org/22NHVZB8W0.

Discussion: Lessons Learned

This article outlines the experience of a partnership between Yemeni and Canadian oncology professionals toward the development of a Yemeni Oncology Program. The CMD (Canadian Medical Delegation) is an informal group of oncology professionals primarily from the University of Western Ontario, who first participated in development of a vision for cancer care in 1989, a topic to which we were again directed in 2001. The first oncology centre (NOC, Sana'a) was opened in February 2005. More than two hundred patients now receive treatment daily. Plans are underway to open additional centres in the country's major cities. The CMD provides ongoing input to the oncology program through mentorship, training and consultation. A "SWOT" analysis for this undertaking is summarized in Table 2.

The relationship between the CMD and their Yemeni counterparts has been based on mutual respect and learning as well as the ability to look for flexible solutions "outside the box". Some of the planned initiatives include the following:

1. Creating the optimal template with the development of the NOC, Sana'a. This will be the initial in-country training centre for oncology professionals and provide leadership for a national program with the creation of several additional centres across Yemen.
2. Promoting a hospital-based cancer registry in the regions surrounding cancer centres.
3. Preliminary determination of cancer risk factors. This

Table 2. A SWOT* analysis for developing an oncology program in Yemen.

Strengths	Weaknesses	Opportunities	Threats
- Common language - Government support - Less bureaucracy - Strong personal values - Strong belief in Western medicine and science - Openness to outside suggestions - Desire to improve situation/ self criticism	- Language difficulties - Understanding culture - Lack of organizational structure - Isolation - Professional shortage - Treatment cost - Establishing trust - Technical support	- Key contacts with government and business - Technology jump - Strong family and tribal units	- High illiteracy - Geographic Isolation - Low GDP - Personalization of misfortune - Technologies disrupt basic values - Corruption - Resistance to change

Table 3. Priority ranking for treating pediatric cancers in a Pakistani hospital with US survival rates.

Disease	Percentage distribution of cancers (%)	Long-term survival (%)	Cost	5-year relative survival USA 1985-1994 (%)
Acute lymphoblastic leukemia	25	60	Intermediate	77
Hodgkin's lymphoma	10	90	Low	91
Non-Hodgkin's lymphoma	10	65	Intermediate	71
Germ cell tumor	3	80	Low	88
Wilms' tumor	5	80	Low	92
Retinoblastoma	6	70	Low	94
Rhabdomyosarcoma and neuroblastoma, or NBS (non-metastatic)	5	30	High	64 (NBS)
Brain tumors: selected non-metastatic and low grade	3	50	Intermediate	Various
Osteosarcoma (non-metastatic)	3	40	High	63
Would not treat				
Acute myelogenous leukemia	5	<10	Very high	41
Stage IV neuroblastoma and sarcoma	15	<10	Very high	-
Relapsed disease and others	10	<10	Very high	-

Source: Personal communication, M.S. Ashraf, Children Cancer Hospital, Karachi, Pakistan. March 2006; Ries et al (1999)

can implemented by itself or as part of a tool such as the WHO STEPwise approach by each cancer centre.[13] This approach uses a chronic disease risk factor surveillance tool using sequential collection starting with core data from health questionnaires, physical measurements and eventually blood samples as necessary to determine risks for development of chronic diseases. It uses a representative sample of the study population which can then be generalized to a larger population.

4. Implementing a month-long observer program in Canada for Yemeni oncologists so that they may appreciate practices that enhance cancer care, including safety standards, multidisciplinary case conferences, guidelines for care, and protocols for treatment. Our experience in developing standards for the safe handling of cytotoxics, the delivery of regional systemic therapy and multidisciplinary cancer conferences although developed by Cancer Care Ontario, is a useful reference for planning and implementing similar concepts elsewhere.[14-16] Chemotherapy medication errors are not uncommon in the developed world and the same methods to minimize these occurrences apply in less developed countries. Accurate and legible

records, pharmacy and nursing checks of physician orders are useful and could eventually be improved with the use of oncology care software.

5. Enhancing the training and number of positions for cancer-related health professions. The highest training priorities include pathology technologists, pathologists, surgeons, and pediatric oncologists. Specialty training is best done using high quality more cost-effective regional training programs in the Middle East.
6. Establishing a medical records system to monitor the effectiveness of cancer control.
7. Drug costs are a major concern. Prioritization of the most effective treatments is necessary. Suggested examples for pediatric and adult cancers have been published in the Institute of Medicine publication on Cancer Control Opportunities in low and middle income countries in 2007.[2] Thresholds for public funding for these agents will depend on economic conditions and the relative importance of benefits in Yemeni society.
8. Treatment will often be ineffective if compliance is poor due to inadequate education of patients and families, or if accessibility is an issue due to finances or geographic isolation. Monitoring whether patients are getting prescribed treatments, especially for curable cancers is fundamental, including the implementation of measures to rectify deficiencies.
9. Adequate resources must be available for symptom control and palliation. Narcotic analgesia is prescribed by physicians at the NOC but it is difficult to obtain elsewhere. Yemen remains one of the lowest users per capita of morphine in the world.[17] The ability to prescribe narcotic analgesics should be expanded in a controlled fashion so that they are available from local sources.
10. It is easy for health care providers to become discouraged. Cancer care providers require support and ongoing encouragement including regular reviews of progress and continuing medical education programs relevant to them. We have therefore unofficially twinned many of our staff at the London Regional Cancer Program in Ontario with those in the NOC. This has resulted in many strong personal ties with our Yemeni colleagues. A vision and mission statement is necessary to focus resources. To maintain sustainability, the CMD is making site visits twice yearly.
11. The current administrative medical leadership at the NOC is overwhelmed at many levels because of the magnitude of their complex task, the pace of change and societal values that do not fully support the delegation of duties. Administrative mentorships for the director of the NOC and other senior administrators should be helpful. Administrative flow charts with responsibilities and clear job descriptions have been created for managerial positions. This will allow the current Director time to focus on executive planning and decisions.
12. Public education is extremely important for prevention and early detection. General measures

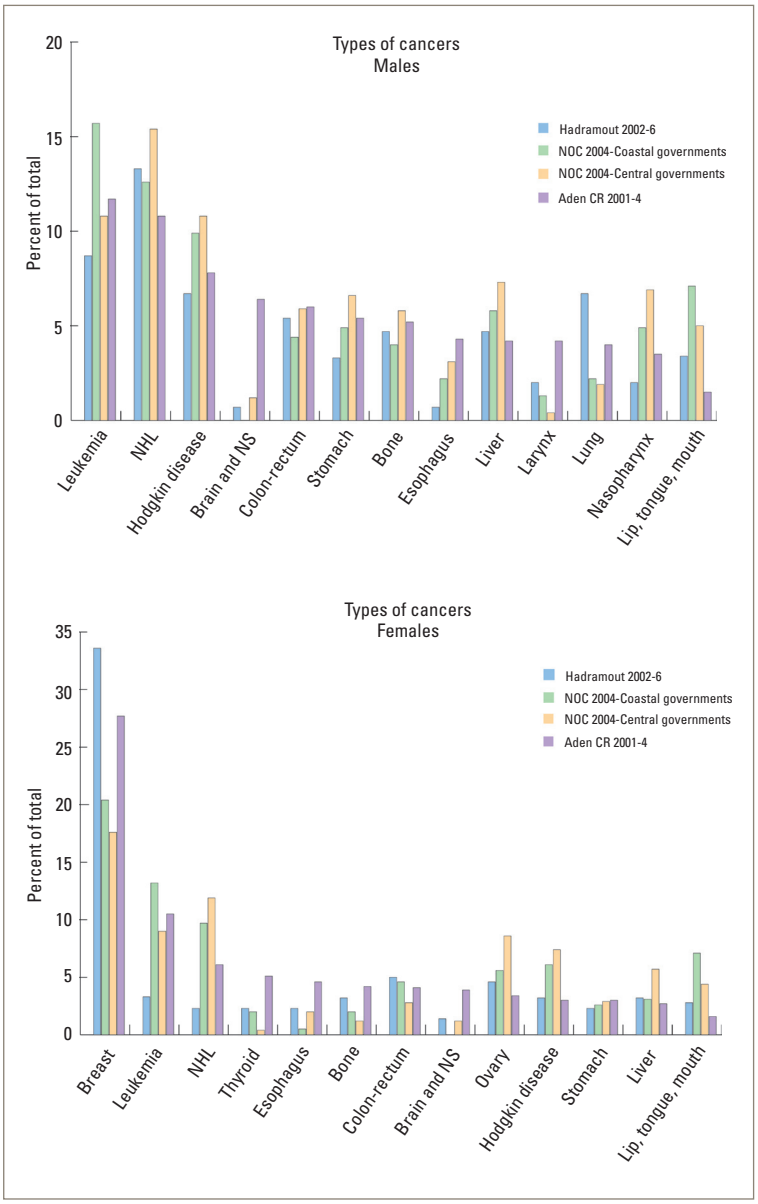

Figure 1. Frequency (%) of different cancers in males and females, recorded (i)in the cancer registry of Aden (2001-4), (ii) patients from 2 regions of the country ("centre" and "coast") from the NOC (Sanaa) registry (2004) and (iii) in the Hadramout registry (2002-2006). Figures compiled by A Bawazir, 2008.

to assure people that cancer is not a punishment but rather, a natural event that can affect anyone may reduce some of the reluctance to disclose. Children are an important vehicle to educate parents. In the course of a recent visit to Sana'a, we found that text messaging was an effective way to encourage women to attend breast health clinics. Trusted local community "healers" can also be an important resource to coordinate cancer education and health promotion activities.

13. It may be cost effective to undertake extensive prevention programs in some areas. Based on current evidence, these might include:
    - Hepatitis B vaccination program (National Program in place in cooperation with UNICEF).
    - Educational programs on the dangers of tobacco. Yemen signed the WHO framework convention on tobacco control in February, 2007.[18] Public health measures as per the WHO convention should be considered.
    - A program to encourage breast self-examination. A comprehensive mammography screening program is difficult to consider at this time based on financial, technical and human resource constraints.
    - A screening program for cervical cancer awaits further development of pathology infrastructure and public education. Education could be integrated into women's health programs. Vaccines are currently too expensive.
    - Improvement in general living conditions should eventually result in a decline in stomach cancer.

Conclusions

We believe that it is premature to attempt to evaluate outcomes. The establishment of a National Oncology Program with regional access to NOC treatment centres is the first step. We are encouraged by the steps taken by the Ministry of Health to fund the NOP, the establishment of a Cancer Board, its signing of the WHO framework convention on tobacco control and its support of the hepatitis vaccination program. We have also been extremely appreciative of the support that the Program has officially received from the government of Yemen, the health professionals working at the NOC and professionals in other major cities in the country. The next critical steps will include development of the National Oncology Program outlining the scope of cancer control, prioritization of objectives and the development of indicators to evaluate the success attaining objectives.

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